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ABSTRACT

This article discusses the research potential for some of the National Center for Educational Statistics' data sets, specifically those focused on junior and senior high school students. All share some characteristics, but it is the most recent (National Education Longitudinal Study: 1988) (NELS:88) which is the most comprehensive. Since data is gathered not only from the students themselves, but parents, teachers, and school administrators, researchers can begin to put the educational process "in context" and include extra classroom factors in their analyses. Data are available on CD-ROMs, a format that has advantages as well as limitations. Given the fact that NELS:88 began when the students were in the eighth grade, it is possible to study the gender gap in mathematics and science. Missing data, internal inconsistencies, and lack of school contextual data are problems. In addition, as presently constructed, these data sets cannot be used to study students attending schools in the very large cities. (Contains 2 tables and 21 references.) (Author/SLD)

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Large data sets: Opportunities and challenges for educational researchers

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Abstract

This article discusses the research potential of some of the National Center for Educational Statistics' data sets, specifically those focused on junior and senior high school students. All share some characteristics, but it is the most recent (National Education Longitudinal Study 1988) which is the most comprehensive. Since data is gathered not only from the students themselves, but parents, teachers, and school administrators, researchers can begin to put the educational process "in context" and include extra classroom factors in their analyses. Data is available on CD-ROMs, a format which has advantages as well as limitations. Given the fact that NELS 88 began when the students were in the 8th grade, it is possible to study the gender gap in mathematics and science. Missing data, internal inconsistencies, and lack of school contextual data are problems. In addition, as presently constructed, these data sets cannot be used to study students attending schools in the very large cities.

Large Data Sets: Opportunities and Challenges for Educational Researchers

Since 1972, the National Center for Education Statistics (NCES) has collected information on the achievements, behaviors, and attitudes of students in public and private schools across the nation and on the attitudes and behaviors of their parents, teachers, and administrators. These data sets have grown larger, more elaborate, and more inclusive with each new issuance. At present, at least four major collections offer educational scholars and policy analysts nationally representative, longitudinal data on adolescents that have yet to be exhausted.

In what follows, we consider both the rewards and frustrations of working with large data sets in general and the National Education Longitudinal Study begun in 1988 (NELS 88) in particular. Throughout, we use our work at the Center for Research in Human Development and Education (CRHDE) at Temple University in Philadelphia. Thus, though we use NELS 88 to illuminate the pitfalls of dealing with missing data and inconsistent responses, these phenomena have applications for working with all large data sets. On the other hand, a specific and primary strength of the NELS 88 data set is that it affords a unique opportunity to study the transition from middle to high school. We have harnessed this aspect of NELS 88 to study the gender gap in math, but there are many research areas that might benefit from this opportunity. Interestingly, even as it enables one research program, NELS 88 curtails another. Because NELS 88 embodies serious errors in the way *urban* has been defined, the data as presently constructed cannot be used to adequately address issues surrounding inner-city education--as we have discovered in our research on "students at-risk."

NCES Data Sets

Housed in the U S Department of Education, the National Center for Education Statistics (NCES) is responsible for collecting statistics on the condition of education in the nation In this capacity, a number of databases are maintained and analyzed The major cross-sectional elementary/secondary school level databases are the Common Core of Data (CCD), the Schools and Staffing Survey, and the Private School Survey At the postsecondary level, the available cross-sectional data bases are the Integrated Postsecondary Education Data System, the National Postsecondary Student Aid Study, the Recent College Graduate Study, the National Survey of Postsecondary Faculty, and the Survey of Earned Doctorates Awarded in the United States The National Household Education Survey (NHES) includes data on pre-primary, primary, and adult literacy patterns Some of these data sets allow comparisons over time (e g , CCD) and some do not (NHES)

For the past three decades, NCES has conducted ongoing studies of adolescents nationwide The first of these, the National Assessment of Educational Progress (NAEP), was begun in 1969 and has been repeated at one- and two-year intervals since NAEP is composed of 9-, 13-, and 17-year-old students (i.e., those in grades 4, 8, and 12) of various racial backgrounds in public and private schools and is chiefly concerned with documenting curriculum and performance changes Approximately 40,000 students per grade level (146,000 total) are sampled in any given year, along with their teachers and school administrators This is not a panel study in that the same student are not included in survey after survey

Three major student-focused longitudinal databases follow and run concurrently with NAEP the National Longitudinal Study of the High School Class of 1972 (NLS 72), High School and Beyond (HS&B), and NELS 88 Each successive project both adds new elements and includes some from its forerunner(s) to facilitate survey-to-survey comparisons With each new database, students were surveyed at younger and younger ages Thus, NLS 72 included only

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seniors, whereas HS&B added sophomores and NELS 88 began with eighth graders (NCES's next project will start when the students are in first grade).

NLS 72 is a national probability sample of 19,001 students designed to be representative of the nation's approximately three million high school seniors in more than 17,000 schools. This large data set follows that group of young people, at intervals, through the 15 important transitional years following high school (to 1986). The NLS 72 survey includes both achievement measures (standardized scores, transcript information, and grade point averages) and demographic data. (For more information, see Ingels, Karr, Spencer, & Frankel, 1990).

"The goal of the second large project, HS&B, was to inform Federal and State policy in the 1980s." (Sebring, Campbell, Glusberg, Spencer, & Singleton, 1987, p. 2). Begun in the spring of 1980, HS&B represented a departure from previous NCES programs in that the initial survey included both sophomore and senior cohorts. The 58,000 students (30,000 seniors and 28,000 sophomores) have been periodically resurveyed. HS&B data include performance measures (test scores) as well as attitudinal, background, school activities, and work data for students and attitudinal and background information for their parents, teachers, and school administrators.

Recently, NCES has initiated to new longitudinal surveys. Beginning Postsecondary Student Longitudinal Study is the first study begining with students first entering postsecondary education. Data for the Baccalaureate and Beyond survey was first collected in 1993. This data set focuses on a cohort of students who are near graduation from college are are about to enter the work force or graduate education. Presently, NCES is planning yet another national longitudinal survey. This one will begin with very young children. Data collection is to being in 1997.

The National Education Longitudinal Study (NELS 88)

The most recent NCES program, NELS 88 was initiated in 1988 with approximately 25,000 eighth-grade students. The stated goals of this third large-scale project are more comprehensive than those of any education longitudinal study to date. "A central theme is that education in America must be understood as a lifelong process enmeshed in a complex social context. This study is also intended to produce a comprehensive data set for the development and evaluation of educational policy at all governmental levels" (Ingels et al., 1990, p. 5). The initial sample of eighth graders is re-surveyed as high school sophomores (1992, the First Follow-Up study) and seniors (1994, Second Follow-Up).

Like HS&B, NELS 88 employs a two-stage sampling design. Schools were selected first and then a random selection of students was made from those chosen schools. Groups oversampled were public schools with high enrollments of Asian and/or Hispanic students, Catholic schools with high minority enrollments, alternative schools, and private schools with high-achieving students. This strategy ensured large enough numbers of Asian and Hispanic students to enable statistical analyses. In cases of sample mortality, samples were freshened with demographically similar students from already selected schools. Elaborate weighting factors must be used to compensate for these design effects. "Panel flags" allow for selecting specific populations for whom particular data are available; for example, flagging only the students for whom teacher information is also available, or who participated in all three (or two) surveys. Over 17,000 students participated in both the Base Year and First Follow-Up surveys, and approximately 16,000 took part in all three questionnaires.

The student surveys included information about the students' socioeconomic status (SES), perceptions of self, school life, family, and educational experiences, and career aspirations. Also available is an elaborate set of variables based on students' scores on a battery of cognitive tests.

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developed by the Educational Testing Service, and transcript files that document students' course-taking behaviors and other achievements (e.g., awards, grades). Although students who have been identified as "dropouts" participate in the general student survey, NELS:88 also maintains separate data files for these students. The focus in these files is on why the students left school before graduation and what they are doing instead of going to school. The parent survey, also initiated in the 1988 base year, includes information about the nature and extent of parental support for their children's educational activities as well as standard demographic data. Student files are supplemented in both follow-ups, and parent files in 1992, with responses from the newly added ("freshened") participants.

The teacher survey contains information from two of the student's teachers related to the teachers' background, instructional practices, attitudes, and perceptions of their students' performances. Finally, the school survey, completed by the administrators of the schools from which students were sampled, offers information about school resources, programs, policies, and some demographic characteristics. The school data, collected in each survey year, contain slightly different information from year to year. In the First Follow-Up file, for example, numerous junior/senior high transition variables were included. In the Second Follow-Up, the focus was on school-to-work transitions.

NCES constructed two types of data files for NELS:88. In the public use files, some variables were suppressed or categorized (e.g., school enrollment, percentage of students receiving free or reduced cost lunches, state where the school is located) to preserve confidentiality. The restricted use files contain almost all of the information NCES collected. Restricted data are available to educational researchers who apply for and meet NCES licensing requirements. Consult the NCES publication, Field Restricted Use Data Procedures Manual (June 1993).

The NELS:88 Data: Technological Advantages and New Research Opportunities

NELS:88 is especially useful for considering large data sets in general, and not simply because it is the newest and thus far most comprehensive of the NCES projects. From support to documentation, NELS:88 represents a number of leading edge advantages in data analysis applications--for example, making the data sets available on CD-ROM, an advantage we discuss in greater detail below. Moreover, beyond technology, NELS:88 is inspirational. Because it is so inclusive and because it is the first NCES data set to follow students from middle to high school, NELS:88 opens new vistas for educational research, and pumps life into existing research programs.

As for using NELS:88, you will find that technical support from NCES is excellent, as is the early documentation: books for each sample (students, parents, etc.) reproduce the questionnaire, list the coding scheme, and detail the procedures of using weights, flags, scales, and test scores (Ingels et al., 1990). This format is both handier and easier to use than that of HS&B, where huge all-inclusive books were published intermittently to cover several years' worth of surveys (Sebring et al., 1987). Unfortunately, the NELS:88 Second Follow-Up did not come with the same documentation as the earlier two phases of the project. According to NCES, printing costs are becoming prohibitive. There are, however, a number of possible solutions to this dilemma: NCES could sell the documentation or produce it on CD-ROM, computer disk, or even distribute it over the Internet through File Transfer Protocols (FTP), giving researchers the option of purchasing, downloading, and printing out their own copies. A final technological innovation, that we consider in more detail below, is the availability of the data sets on CD-ROM.

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Beyond the concerns of day-to-day applications, NELS 88 is a comprehensive and inclusive set of instruments, offering data of interest to scholars with a variety of research agendas. For example, students are asked not only about their school and family, but also about violence and drugs. Teachers describe classroom routines as well as providing evaluative information about their students. Administrators completed this questionnaire on the basis of the entire school--not just those students included in the NELS 88 sample--and so the School set is particularly useful in ferreting out "school effects" (See Gamoran, 1987, Stull, Rigsby, & Morse-Kelly, 1995b). For those who can obtain an NCES license, NELS 88 data are further enhanced by the suppressed variables that, while continuing to protect the anonymity of the individual participants, make highly specific analysis possible: for example, state-by-state comparisons.

Perhaps most important from the standpoint of research design is that, unlike previous data sets, NELS 88 begins with eighth grade. This allows observation of a critical period, the transition from junior to senior high school. For researchers interested in dropout prevention, for example, it is possible for the first time to identify the "early dropouts," those students who drop out by sophomore year of high school. Among students who participated in both Base Year and First Follow-Up surveys, 856 students left school (some more than one time) between eighth grade and sophomore year. In the second Follow-Up, 1,796 dropouts participated in the survey. Attention to these subset populations can yield critical information to help better identify students at risk of never graduating. Another way in which transition data can be invaluable is in relation to the gender gap in math, a continuing area of research at CRHDE that we discuss at length below.

NELS 88 Applications: The Power of CD-ROM Technology

Presently, NELS 88 offers the public use data on CD-ROM. The CDs are free, and the software used to extract the variables is straightforward. Using CD-ROM technology

researchers are not dependent on the vicissitudes of a mainframe and are freed from the sometimes complicated tape manipulation and other mainframe requirements. Although the bulk of our analyses have been done on a mainframe, we have used this CD-ROM technology with SPSS software (Windows version; a DOS version is also available) and have found it useful in doing some of the secondary analyses. With some minor programming changes to the SPSS syntax files generated by the CD-ROM software, users can make simple tabulations within minutes. With a little practice, more complex analyses (say, within-group regressions, using weights) are also possible.

The costs of CD-ROM technology, however, can be considerable. To use the CD-ROM data set, you will need a high-end computer with an adequate harddrive and a CD-ROM player, as well as SPSS or SAS software. Conservatively this could cost a few thousand dollars, which may make adopting CD-ROM technology out of reach for many individuals or their institutions -- particularly academic institutions, which tend to lag behind in updating faculty computer technology. A further consideration is that statistical analyses tend to be paper-intensive and in this respect are perhaps more suitable to mainframe resources.

NELS 88 Research Opportunities: Transition Data and the Gender Gap

Although researchers have called for generalizeable studies of the gender gap (e.g., Berryman, 1983; Oakes, 1990), until NELS 88, data were not available to study male-female differences during the transition from junior to senior high school for a representative national sample. We used the first two waves of the project (1988, 1990; population of about 17,000) to examine the gender gap in math. Because NELS 88 is comprehensive, we were able to measure the gender gap in a number of ways. Performance, as represented by the cognitive subject test scores; perception, as measured by a generalized self-concept scale provided in the data files and a specific mathematics attitude scale constructed from several separate variables; and

participation, as indicated by the number and kinds of math classes taken. Moreover, because NELS:88 (like other large data sets) includes critical demographic data, we could examine the gender gap as it manifests in different race/sex/SES groups.

Considering differences for the male and female populations in general, our analyses suggested that the gender gap already exists in eighth grade. Boys score slightly higher, though with more variability, than girls on standardized math tests in both eighth grade and sophomore year and girls' scores on the self-confidence scale were noticeably lower than boys in both surveys. Though girls took more (or more advanced) math courses than boys in eighth grade, they did not continue that practice when they got to high school. This is similar to what others have found. (See Kline & Ortman, 1994).

Table 1, which shows distributions of math test scores, is representative of some of our further explorations of the gender gap and illustrates the importance of ethnic-sensitive analyses (Catsambis, 1994). The gender gap in math performance is not universal but rather varies from group to group. There are no sex differences among Asians and African Americans in either the Base Year or the First Follow-Up. Latinos and whites, however, evidence a gender gap in math performance as early as eighth grade. It is also worth noting that racial patterns are the same for both sexes: Asians score highest, with white students slightly behind. Latinos and African Americans score about 10 points lower on average than Asians. Indeed, in relation to performance, racial differences seem more pronounced than gender differences, as the male-female difference in test scores is never as great as the Asian-African American difference.

<Table 1 about here>

By contrast, the gender gap in perception, as measured by the NCES self-concept scale, is much more dramatic, universal, and sex-specific. The mean for all girls, regardless of race and

SES, is lower than that of their male counterparts in both the Base Year and First Follow-Up surveys. Interestingly, the scores for the African-American girls were not as low as those for the three other race/ethnic groups.

These preliminary findings evidence some of the ways in which the NELS 88 data can be used. We see here that the gender gap in math performance already exists by eighth grade for some students but has not yet emerged for others, while the gender gap in self-concept is already present in middle school and affects all females. The challenge now is to continue refining the model of the gender gap in performance, perception, and participation, and assessing how male-female differences are mediated by race, SES, ability, and school effects. (for more complete results, see Morse-Kelly, 1995). Others have found a gender gap in self-esteem (see American Association of University Women, 1992; Fennema, 1974).

The NELS 88 Data: Some Precautions

Every large data set is to some extent a "work in progress," in that the successes and omissions of its predecessors and successors play some role in its conception and execution. Inevitably, then, as is the case with NELS 88, there are aspects of the project that limit its usefulness or that must be taken into account in analyzing the data. Some problems are not specific to NELS 88, but rather a universal consideration of working with large data sets. Thus, though we use the NELS 88 data to illustrate the pitfalls and challenges of missing values and inconsistent responses below, these are topics researchers must grapple with using any of the NCES databases. Other problems apply only to NELS 88 -- omissions, for example. Although there appears to be more than enough information in the NELS 88 files, in reality there is not. Far more serious than the omissions, however, is the error in the survey design that we detail below: the definition of "urban."

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Large Data Sets: The Recoding Challenge of Missing Values

Working with the NELS 88 data for the past two years, we have discovered the truth of the old aphorism that preparation is more than half of the job. Some of the most critical and consequential decisions necessitated by large data sets are those pertaining to recoding and reclassifying missing data. For example, several researchers have devoted considerable attention to explaining the effect of ability groupings on educational outcomes (e.g. Slavin, Madden, Karweit, Livermon, & Dolan, 1990; Hallinan & Sφrenson, 1987). Unfortunately, in NELS 88, 22% of the responses to the ability groups variable are unusable, either because they are missing or because the student responded "don't know" or "classes not grouped by ability."

There are several strategies for dealing with missing answers. First, because NELS 88 contains different files for several populations, the best method for redistributing missing data is to cross-reference student answers with those provided by teachers and administrators. Thus, schools that do not employ ability-grouped instruction should "match" the students making such a claim. Similarly, teachers' indication of the students' ability group can be used to fill in missing answers (and to check for consistency). This method, however, will almost certainly not eliminate all the missing values, which makes choosing another strategy almost unavoidable.

By far the easiest missing data strategy is to simply ignore missing cases. Thus, in the case of ability groups, it could be assumed that the 22% missing are not classified into ability groups. An equally quick-and-easy strategy would be to reassign all missing values to some measure of central tendency of the sample population. Missing cases could be assigned to the mode for nominal, and the mean for interval, variables. In our example, the modal category is the Middle Ability Group. Interestingly, since researchers tend to be interested in the High and Low ability groups, the decision to recode missing cases this way may have the same practical effect as simply eliminating them. Either strategy, however, is potentially a problem because the

"missing" group is typically not a random phenomenon. To illustrate: Far from being a "representative subset" of the larger sample population, the group of students missing an ability group value contains more boys than girls, and a larger proportion of African American, Latino, and low-SES students than is in the general population (i.e., while 32% of the entire sample is low SES, 44% of the missing group is low SES). Thus, by dealing with missing cases too sweepingly, we remove from analysis precisely those students most critical to much educational research.

There are, moreover, serious issues involved with homogenizing missing responses, either by discarding or reassigning them. This problem stems, first of all, from the fact that there are different kinds of missing answers and they are not all equivalent. Some are legitimate (e.g., the school does not use ability-grouped instruction). Others result because the student refused to answer the question. These are very different phenomena, and provide different kinds of information. One tells us about the school, and the other about the student. Similarly, if it is our theoretical orientation that the school has a vested interest in keeping certain kinds of information from students, then we ought not to treat "don't know" answers as if they were no different than "school does not have" answers.

Moreover, as the standardized test scores illustrated, students in the NELS 88 sample are not homogeneous: there are wide dispersions among the eight sex/race groups. The integrity of any analysis would surely be compromised were students to be treated as though the group mean or mode (which generally reflects the mean for whites) accurately represented all the different groups in the sample. The most theoretical and methodologically sound way of dealing with missing data, therefore, is by the hot deck procedure. That is, by assigning missing values the same value as that of cases with similar characteristics. Thus, for ability groups, it might make sense to reassign missing values to the mode (mean) of students with the same race/sex/SES to capture individual characteristics. We might also include in this set of characteristics the type of

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school (public or private) and the size of the eighth-grade class, since the presence (or absence) of ability grouped instruction can be the result of school characteristics

Internal Inconsistency: The Case of NELS 88

A related problem to that of missing values is the number of inconsistent and unexpected answers (See Morse-Kelly, Stull, & Rigsby, 1995). Again, this is not necessarily a problem specific to NELS 88, but rather "comes with the territory" of working with large data sets. Indeed, given that we are dealing with adolescents who have been assured of their anonymity, we might well wonder why more students do not engage in "creative" survey responses.

It is possible to check for internal validity since the same information is elicited in several different places/questions in the same survey as well as in different surveys. For example, in the First Follow-Up survey, there are several questions about math that contain the response "not taking subject": hours spent on math homework (in and out of school), attitudes toward math classes, and math grades. In addition, there is a "lead" question that allows students to check off that they "have not yet taken math" and thus skip all the questions that follow. There is surprisingly little consistency from one question to another -- the number of students "not taking math" varies with each question, and far more students claim not to take math in relation to doing homework (almost 1,000, combined in and out of school) than in relation to giving their grades (only 122). Examples of survey-to-survey inconsistency include students who gained (or lost) 12 or more family members between the Base Year and the First Follow Up and students who were taking advanced math in 8th grade but remedial math in 10th grade.

Unfortunately these data problems are not confined to the student responses. The School files, for example, also include some interesting/problematic findings. When asked, "How many days in a row can a student be absent without an excuse before he or she is considered a truant," 39% of the administrators responded "0 days." Is this a case of "mental truancy?" Similarly,

29% of the administrators consider a student a dropout after the student has missed 0 days of school. Schools report offering Advanced Placement courses in Business Math, General Math for grades 10-12, ninth grade General Science, and so on. The fact that even administrators can give outlandish answers is an important cautionary note for procedures such as cross-checking answers and/or assigning higher credibility to answers given by adults.

Another kind of inconsistency results from "additive" questions: that is, a series of questions asking, for example, how many hours per week students spend on math homework, social studies homework, English homework, and so on or which ask students if they live with their mother, father, grandmother, sister, and so on. If you were to sum the series responses, you would find that some students spend 160 hours per week on homework, or live with 42 family members, or take 22 math classes, or are members of every club.

We are only now beginning to make use of inconsistent responses in large data sets as a way to understand other aspects of schooling processes and outcomes (see Morse-Kelly, Stull, & Rigsby, 1995). While the number of participants who give inconsistent or unexpected responses for any one question is generally small, they, like those whose answers are missing, are not representative of the general population. Students who claim to do 160 hours of homework a week, or to take every math course, are more likely to be among the lowest SES students with below-average performance on conventional school measures of ability (e.g., standardized tests). This has implications for considering the correlation between, say, math ability on standardized tests and the number of hours spent on homework. To give another example, the sex distribution in the NELS 88 sample population is 50-50 (M:F), but among students claiming to have gone from advanced to remedial math, the sex distribution is 57-43. In other words, inconsistency here is more likely to be a male trait. This could have serious implications for studying, to draw on our previous study area, the gender gap as it relates to course-taking behaviors.

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At the very least, the potential for unexpected responses in NELS 88 requires researchers to spend some preparation time familiarizing themselves with the variables and plotting an appropriate strategy for their research project. Outlandish responses may need to be recoded, perhaps via the hot deck method, in the same way missing answers are re-categorized. In some cases, it will be possible to cross-reference student answers, with parent, teacher, or transcript data, to ensure more accuracy, although you should defend the assumption implicit in this method that one group (parents/teachers) is inherently more "right" (accurate) than another (students). Finally, variables constructed from additive responses (total hours homework, family size, number of math courses) may need to be truncated before they can be used for a regression run. Given the inverse relationship between claiming to spend 160 hours on homework and GPA, for example, the high number (160) may mask the actual relationship.

◆NELS 88 Omissions and Shortages

While we can appreciate the need to simplify the data-gathering instruments in a project of this magnitude, serious omissions can result. One of the most noticeable shortcomings of the NELS 88 data set is what we call a "lack of context." No school district information is given for any of the schools in the study. It would be useful to know, for example, how many other high schools there are in the district, schools to which the student could transfer. Students may be more accepting of their school if it is the only viable option, or they may feel less trapped if they have other choices. The same is true of teachers. One of the variables in the School file is the number of teachers who left in the previous year. Leaving is not only a function of dissatisfaction with the original school, but also of the possibility of transferring or being transferred to another. Schools with some unsatisfied teachers may not have any or few who left simply because there was no school to which to transfer. Similarly, in the School survey administrators were asked about relationships between the school board and the community. In a

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very large school district there most probably would be little or no direct relationships, but in a one-school town the reverse would be true. The percentage of the students in the school receiving free lunches is included in the restricted data file, but not in the public use file. Imprecise as it is, this is the only measure of the social class of the students as a whole attending the school. Nor is there any information about school finances provided other than a question or two about teachers' salaries, which are only reported in very broad categories, so it is difficult to include any analyses of priorities. A final example of lack of context is the disembodied opinions of teachers and administrators regarding why students drop out of school. Since we cannot tell from the NELS 88 data how much contact these authority figures may have had with problem students, there is no way for us to evaluate these opinions.

In general, more data are collected about attitudes than behaviors. Moreover, even behavioral questions are phrased subjectively. Students and teachers are asked many questions about their habits and practices, that is, how many times students talk to their parents about high school courses, how much time teachers spend grading papers, and so on. The imprecision of many responses ("several times," "a few times"), however, tends to make these answers less precise and less helpful than they might otherwise be.

Even demographically, NELS 88 contains some omissions. There is a surprising lack of information about the teachers as a group, for example. While the age, experience ,and sex is given for those teachers selected to complete a survey, no basis is given for determining how representative of the school as a whole this subset of teachers is. This omission prevents the kinds of analyses that might follow our exploration of the gender gap. For example, to what extent is the sex of the teacher correlated with the allocation of rewards (e.g. high ability group placement) in middle and high school? We have no variables that allow us to assess the work and intellectual climate among teachers.

And, just as there is potentially valuable data missing in relation to teachers, the same is true (surprisingly) of students. There are some large gaps in information about peers: for example, Does the student have a boy/girlfriend (and what does that mean in terms of behaviors). How often does the student date? How many friends does the student have? Are they from in-school or out-of-school? Are the in school friends the same types as the out of school friends? To what extent are the student's friends similar to peers in the neighborhood and/or the school? How are conflicting pressures between in-school and out-of-school friends resolved? Given the fact that negative peer pressure is an important determinant of academic achievement/aspirations (See Rigsby, Stull, & Morse-Kelly, 1994), more explicit information should have been collected about the nature of these relationships. Aside from peers, the students' work experience is only vaguely detailed in NELS 88. While HS&B could be criticized for including too much work experience material, NELS 88 almost represents the other extreme. Questions about the student's current job are included, but not about the student's job history as a whole. And, while there are numerous questions in the second Follow-Up School file about school-business relationships and job training programs, there is little actual work experience information. To evaluate the effectiveness of school programs, better wage information is necessary. It would also help to have some estimate of the prevailing wage in the community since this varies considerably from region to region.

Finally, there are omissions of school data. The possibility of schooling effects has a long history in the literature, and education scholars believe differences in schools and in opportunities within schools affect schooling performances. NELS 88, however, lacks enough information to allow researchers to adequately address this issue. While test information is given for the individual students included in the sample, no information is given for the school as a whole. Students in the sample were randomly selected, not because they were representative of the

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school they attended. School SAT/ACT averages are given, but cannot be included in any analyses because the percentage of schools reporting these results is so low.

Many of these problems could be resolved or reduced if linkages with other NCES data sets could be established. Since different schools are included in the different data sets, composite variables would have to be constructed for similar types of schools. This would greatly enhance the depth and range of research activities.

NELS 88 Design Flaws: The Definition of "Urban"

More serious than the lack of school district information is the problem we encountered while considering the educational experience of "at-risk," i.e., inner-city, students. In an earlier paper (Rigsby, Stull, & Morse-Kelly, 1994), we used the Urban/Suburban/Rural variable provided in the public use files to investigate the relationship between educational achievement and aspirations. Unexpectedly, students attending schools classified as "urban" are the same as or better off than their counterparts attending schools classified as "suburban." For example, on the average, urban students scored the same as suburban students (10th grade mathematics test) or higher (10th grade math/reading test). Also, urban students were higher on both the Locus of Control and Self Concept scales. These results raise the issue of whether the urban category in the public use data files is too broad to be used in any investigation of large city education.

To investigate the issue of urbanicity further, we collected information from the 1980 and 1990 censuses for cities with populations over 600,000 in 1980. From the census, we collected the number of boys and girls aged 5/6 in 1980, who thus would be in the NELS 88 population. We also collected the number of boys and girls aged 13/14 in 1980 and aged 13/14 in 1990 to determine how representative the NELS 88 urban group is of the largest cities in the United States. These figures were further broken down by race, children living in poverty, and single-parent households. When these figures are compared to the relevant figures in the NELS 88 data

set, it is obvious that there is a problem and it is a serious one. African-American students attending schools in the very largest cities are vastly underrepresented in the NELS 88 data set. In the North Central region, for example, according to census data, 26.74% of the 13/14 year-old population is African American. In the NELS 88 data set, however, only 4.5% of this same regional group is African American. White students, on the other hand, were overrepresented. (See Table 2). These same discrepancies between census and NELS 88 data also appear when we compare "percent in poverty" and "single-parent households" (see Stull, Rigsby, & Morse-Kelly, 1995a).

<Table 2 about here>

This problem results from the fact that NCES used the census concept of "central city" to define urban. The largest city in a Metropolitan Statistical Area (MSA) is a central city. Other "cities" may be included if they meet density/employment criteria. As a result there is considerable variation in the populations of these central cities, ranging from New York City (7,164,742) to Benton Harbor, Michigan (14,246). Almost 70% of these cities had populations of less than 100,000, accounting for 24.04% of the total number of people defined as living in a "central city." In addition, some older declining cities may be excluded because of the employment criteria. For example, the Philadelphia PMSA includes three central cities: Philadelphia (1, 646,713), Norristown (34, 387) and Camden, New Jersey (82, 537). Chester (40,834), a decaying city, was not included as a central city and therefore was categorized as suburban in NELS 88.

In other words, the NELS 88 data as they are now constructed cannot be used to study the education problems in very large cities, which are the cities most often cited in discussions of issues of poverty and problems of urban education (see Kantor & Brenzel, 1992; Reed & Sautter

1990). Essentially, a researcher using the urbanicity variable provided in the public use data set would not be able to capture the depth of the social problems existing in the very large cities, or to be sure of a sample representative of critical urban demographic characteristics (Arnold, 1995). One wonders if the "improvements" in the urban condition beginning to appear in the literature (e.g., recent claims from the Council of the Great City Schools in Washington, DC) have more to do with the "redefinition" of urban than anything else. In the short run, adding one variable -city size broadly defined -- to both the public use and restricted files would go far to alleviate the problem.

This, incidently, is not a problem just with NELS 88, but rather applies to all of the recent NCES surveys as each used the Census definition of "urban." Care must be taken in making any generalizations using the urban/suburban/rural designation included in the data set. In addition, very large city populations are underrepresented.

Conclusion

Although initially intimidating, these NCES large data set projects are well worth investigating. Nowhere else is there such a wealth of data available to educational researchers on such a routine basis. The scope of possible analyses is limited only by the user's imagination. We heartily encourage even the most fainthearted to become involved.

Table 1
The Gender Gap in Test Scores by Race/Sex Groups

TEST SCORES	**African American**		**Asian**		**Latino**		**White**	
	Male n= 768	Female n=846	Male n=420	Female n=502	Male n=961	Female n=981	Male n=5,830	Female n=5,914
BY: Standardized Math Test Score Mean (SD)	44.95 (8.3)	44.86 (8.6)	56.05 (10.4)	56.25 (9.12)	47.32 (8.8)	46.04 (8.5)	53.41 (9.8)	53.05 (9.5)
	t= .22*		t = - .33		t = 3.27		t= 2.04	
F1: Standardized Math Test Score Mean (SD)	45.26 (8.7)	45.32 (9.0)	55.99 (9.9)	56.20 (8.6)	47.60 (9.1)	46.60 (8.5)	53.06 (9.9)	52.83 (9.1)
	t= - .13		t = - .36		t = 2.49		t = 1.29	

Population: Students participating in both Base Year (BY) and First Follow-Up (F1) surveys, excluding Dropouts and Native Americans

Table 2

Gender/Race Distributions by Region

Region	1980 Census 5/6 yr olds	1990 Census 13/14 yr olds	Base Year* 13/14 yr olds	First Follow-Up* (G8urban)	(G10urban)
Northeast					
Af Amer	17.16	18.81	17.20	5.40	4.95
White	22.73	24.28	14.95	37.60	38.55
North Central					
Af Amer	26.00	26.79	26.79	4.05	3.65
White	19.07	15.66	15.68	42.30	42.75
South					
Af Amer	21.12	23.19	20.54	11.10	11.55
White	23.15	22.49	19.68	32.05	32.15
West					
Af Amer	7.96	9.18	3.34	2.70	2.95
White	27.88	29.17	15.0	29.45	29.85

* Percentages based only on students who were identified as "urban" on the G8urban (G10urban) given in the public use file. Census figures are based on data from the 17 cities with a population of 600,000 or more in 1980.

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